

**AMENDMENTS TO THE CLAIMS**

This listing of claims will replace all prior versions, and listings, of claims in the application.

1 - 31. (Cancelled)

32. (Currently Amended) An apparatus comprising:

a silicon substrate; [[and]]

a microresonator disposed on the silicon substrate, the microresonator having an annular structure to recirculate light at a desired wavelength, the microresonator including one or more of [[silicon]] nanocrystals [[and silicon-germanium nanocrystals]] in a matrix; and

a pump disposed vertical relative to the microresonator to excite recirculation of light in the microresonator.

33. (Currently Amended) An apparatus as claimed in claim 32, further comprising at least one patterned waveguide disposed on the silicon substrate wherein light may be coupled between the microresonator and the waveguide.

34. (Previously Presented) An apparatus as claimed in claim 33, wherein the waveguide is above the microresonator.

35. (Previously Presented) An apparatus as claimed in claim 33, wherein the microresonator is coupled between two waveguides.

36. (Previously Presented) An apparatus as claimed in claim 32, wherein the annular structure is a ring.

37. (Previously Presented) An apparatus as claimed in claim 36, wherein the ring has a length from a center of the ring to a center of a waveguide that forms the ring being proportional to an integer multiple of a desired wavelength.
38. (Previously Presented) An apparatus as claimed in claim 32, wherein the annular structure is a disk.
39. (Previously Presented) An apparatus as claimed in claim 38, wherein the disk has a perimeter that is an integer multiple of a wavelength.
40. (Previously Presented) An apparatus as claimed in claim 32, wherein the nanocrystals are included in at least one of silicon dioxide, silicon nitride, and alumino-silicate.
41. (Previously Presented) An apparatus as claimed in claim 32, wherein the microresonator includes one or more rare earth elements.
42. (Previously Presented) An apparatus as claimed in claim 41, wherein the one or more rare earth elements includes at least one of erbium and ytterbium.
43. (Currently Amended) An apparatus as claimed in claim 32, [[further comprising a]] wherein the pump is above [[or below]] the microresonator [[to excite circulation of light in the microresonator]].
44. (Currently Amended) An apparatus as claimed in claim 32, [[further comprising a pump to excite circulation of light in the microresonator,]] wherein the pump is to tunnel current through [[silicon dioxide]] the microresonator to form electron-hole pairs in the nanocrystals [[in the silicon dioxide]].
45. (Currently Amended) An apparatus comprising:

a silicon substrate;

a microresonator disposed on the silicon substrate, the microresonator having an annular structure to recirculate light at a desired wavelength, wherein the microresonator includes silicon nanocrystals, silicon-germanium nanocrystals, or a combination thereof; and

a patterned waveguide disposed [[above]] vertically relative to and optically coupled with the microresonator.

46. (Previously Presented) An apparatus as claimed in claim 45, wherein a distance between the waveguide and the microresonator is equal to or less than 250 nanometers.
47. (Previously Presented) An apparatus as claimed in claim 45, further comprising a second waveguide optically coupled with the microresonator.
48. (Previously Presented) An apparatus as claimed in claim 45, wherein the annular structure is a ring having a length from a center of the ring to a center of a waveguide that forms the ring being proportional to an integer multiple of a desired wavelength.
49. (Previously Presented) An apparatus as claimed in claim 45, wherein the annular structure is a disk having a perimeter that is an integer multiple of a wavelength.
50. (Previously Presented) An apparatus as claimed in claim 45, wherein the microresonator includes one or more rare earth elements.
51. (Previously Presented) An apparatus as claimed in claim 45, further comprising a pump above or below the microresonator to excite circulation of light in the microresonator.

52. (Previously Presented) An apparatus as claimed in claim 45, further comprising a pump to excite circulation of light in the microresonator, the pump to tunnel current through silicon dioxide to form electron-hole pairs in the nanocrystals in the silicon dioxide.
53. (New) An apparatus as claimed in claim 32, wherein the pump comprises an LED.
54. (New) An apparatus as claimed in claim 53, wherein the LED emits light at a wavelength that is less than 900 nanometers.
55. (New) The apparatus as claimed in claim 45, wherein the patterned waveguide is disposed above the microresonator.
56. (New) The apparatus as claimed in claim 45, wherein the patterned waveguide includes material deposited on the silicon substrate.
57. (New) An apparatus comprising:  
a silicon substrate;  
a microresonator disposed on the silicon substrate, the microresonator having an annular structure to recirculate light at a wavelength, the microresonator including nanocrystals in an Al-SiO<sub>x</sub> matrix; and  
a patterned waveguide optically coupled with the microresonator.
58. (New) The apparatus of claim 57, wherein the patterned waveguide is positioned vertically relative to the microresonator.
59. (New) The apparatus of claim 57, further comprising a pump positioned vertically relative to the microresonator to excite recirculation of light in the microresonator.

60. (New) The apparatus of claim 57, further comprising an LED to excite recirculation of light in the microresonator.